WHAT IS CLAIMED IS:

1. A method of determining an alternative communication path in a communication network built with a plurality of network nodes, comprising:

assuming that a network failure occurs at a location in a current communication path through the network nodes;

determining a failure detected network node that detects the network failure, out of the network nodes;

calculating a failure notification time for each network node, the failure notification time indicating a time from when a failure notification message is transmitted by the failure detected network node until the each network node receives the failure notification message;

selecting a first network node out of the network nodes based on the failure notification time, the first network node being positioned in the current communication path on upper stream from the location of the network failure; and

determining an alternative communication path that includes the first network node and a second network node out of the network nodes, the second network node being positioned in the current communication path on down stream from the location of the network failure.

2. The method according to claim 1, wherein the failure notification time of the first network node is the shortest of the network nodes that are positioned on upper stream from the location of the network failure.

3. The method according to claim 1, wherein the failure notification time of the first network node is smaller than a predetermined time.

4. The method according to claim 1, wherein the alternative communication path allows to share an auxiliary communication capacity for other network failure.

5. The method according to claim 1, wherein the failure notification time is calculated as a sum of a propagation delay time of a communication link between the network nodes and a processing time for inputting/outputting the failure notification message in the each network node.

6. The method according to claim 1, further comprising calculating a recovery time of the communication path as a sum of the failure notification time of the first network node, a switching time of each network node on the alternative communication path , and a propagation delay of a signal to be transferred.

7. An apparatus for determining an alternative communication path in a communication network built with a plurality of network nodes, comprising:

a node selecting unit that determines a failure detected network node that detects a network failure that is assumed to occur at a location in a current communication path through the network nodes,

out of the network nodes, calculates a failure notification time for each network node, the failure notification time indicating a time from when a failure notification message is transmitted by the failure detected network node until the each network node receives the failure notification message, and selects a first network node out of the network nodes based on the failure notification time, the first network node being positioned in the current communication path on upper stream from the location of the network failure; and

a path searching unit that determines an alternative communication path that includes the first network node and a second network node out of the network nodes, the second network node being positioned in the current communication path on down stream from the location of the network failure.

8. The apparatus according to claim 7, wherein the failure notification time of the first network node is the shortest of the network nodes that are positioned on upper stream from the location of the network failure.

9. The apparatus according to claim 7, wherein the failure notification time of the first network node is smaller than a predetermined time.

10. The apparatus according to claim 7, wherein the alternative communication path allows to share an auxiliary communication

capacity for other network failure.

11. The apparatus according to claim 7, wherein the failure notification time is calculated as a sum of a propagation delay time of a communication link between the network nodes and a processing time for inputting/outputting the failure notification message in the each network node.

12. The apparatus according to claim 7, further comprising a calculating unit that calculates a recovery time of the communication path as a sum of the failure notification time of the first network node, a switching time of each network node on the alternative communication path , and a propagation delay of a signal to be transferred.

13. A computer program product for realizing a method of determining an alternative communication path in a communication network built with a plurality of network nodes, including computer executable instructions stored on a computer readable medium, wherein the instructions, when executed by the computer, cause the computer to perform:

assuming that a network failure occurs at a location in a current communication path through the network nodes;

determining a failure detected network node that detects the network failure, out of the network nodes;

calculating a failure notification time for each network node, the

failure notification time indicating a time from when a failure notification message is transmitted by the failure detected network node until the each network node receives the failure notification message;

selecting a first network node out of the network nodes based on the failure notification time, the first network node being positioned in the current communication path on upper stream from the location of the network failure; and

determining an alternative communication path that includes the first network node and a second network node out of the network nodes, the second network node being positioned in the current communication path on down stream from the location of the network failure.

14. The computer program product according to claim 13, wherein the failure notification time of the first network node is the shortest of the network nodes that are positioned on upper stream from the location of the network failure.

15. The computer program product according to claim 13, wherein the failure notification time of the first network node is smaller than a predetermined time.

16. The computer program product according to claim 13, wherein the alternative communication path allows to share an auxiliary communication capacity for other network failure.

17. The computer program product according to claim 13, wherein the failure notification time is calculated as a sum of a propagation delay time of a communication link between the network nodes and a processing time for inputting/outputting the failure notification message in the each network node.

18. The computer program product according to claim 13, further comprising calculating a recovery time of the communication path as a sum of the failure notification time of the first network node, a switching time of each network node on the alternative communication path , and a propagation delay of a signal to be transferred.